THE Soybean Digest

Official Publication
OF
THE AMERICAN SOYBEAN ASSOCIATION

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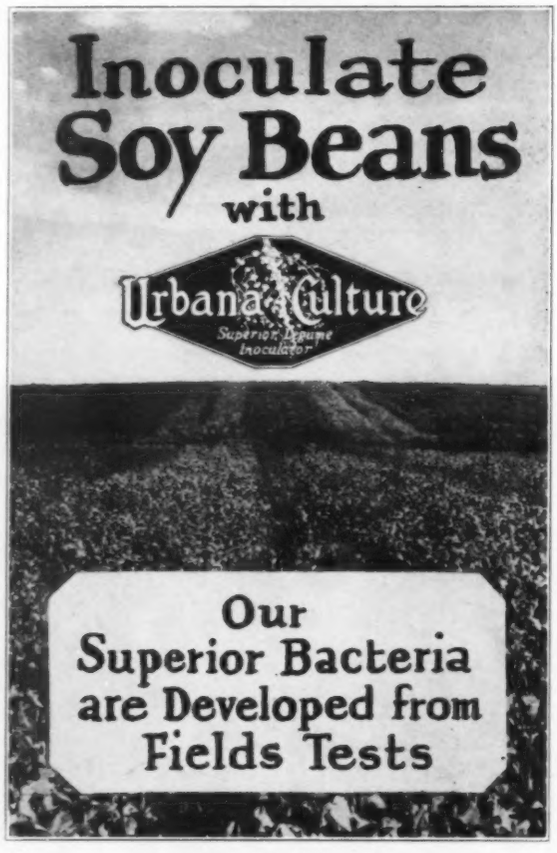

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THE *Soybean Digest*

VOL. I — MARCH · 1941 — No. 5

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Between the Headlines

As spring and thoughts of seeding begin to enter many growers' minds, inoculation, a science just beginning to realize its own possibilities, furnishes the topic for the feature found on pages 2 and 3. The importance of making our legumes more efficient as agents for fixing nitrogen from the air is realized when we consider that our nitrogen balance sheet shows a net loss of about 7 million tons annually. As yet inorganic nitrogen is more a possibility than a reality as a replacement for this lost nitrogen. It represents only about 2 percent of the total nitrogen returned to our agricultural areas.

Next month, *The Digest* will carry a story by H. R. Smalley, director of soil improvement work of the National Fertilizer Association, on soybean fertilization, a problem arising from the vastly increased soybean acreage in the last few years.

Dr W. J. Morse, senior agronomist of the Bureau of Plant Industry, has prepared a review of ancient Chinese literature on time of planting. The soybean has reached its present status in this country to a great extent through the efforts of Dr. Morse, and we're sure you won't want to miss this story, on page 5. Dr. Morse also supplied the pictures reproduced there.—J. W. T.

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Should Inoculation be done Annually?

*Legume Bacteria Account for 30 Percent of Nitrogen Added to Soil; Science Strives to Make It Even More

A FEW years ago any seed dealer who dared to tell a farmer he should inoculate his soybean seed each year even on ground that had previously been in soybeans probably would have met only a cold stare. Why, everyone knew it wasn't necessary, once the bacteria were established in the soil!

Today, however, laymen are beginning to learn what many bacteriologists have known for a long time, that this business of inoculation is by no means a settled question, that we have only sketchy knowledge of details affecting growth and propagation of the bacteria and of the processes entailed in nitrogen fixation by these bacteria.

First Theory Advanced

Knowledge of the value of legumes in the farm rotation date back to ancient Greece and Rome, but it was not until the 1880's that it was definitely established that legumes could take free nitrogen from the air, when Germans Hellriegel and Wilfarth advanced the first comprehensive theory that bacteria formed nodules on the roots of legumes which enabled them to fix free nitrogen from the air.

Although this basic fact was established so recently, great advances have been made in turning to practical use what has been discovered about legumes and the bacteria that live with them, and research is constantly bringing new refinements.

The discovery having the greatest effect on legume inoculation practices was the fact that strains of the rhizobia (nitrogen-fixing bacteria living in the nodules of legumes) may vary widely in ability to benefit the host plant, even though nodules are readily formed. A vague comparison might be the way different varieties of a grain crop are adapted to different soil and climatic conditions.

May Lose Effectiveness

This in itself wouldn't have complicated the propagation of cultures for inoculation, for the manufacturers could have found a good, efficient strain and propagated that strain forever after. But it was also found that cultivation on certain types of laboratory medium often cause a good strain to lose its effectiveness, and that likewise strains growing in the field may suddenly lose their effectiveness.

It was these discoveries that sped the passing of the once-common practice of inoculating with soil from a field supposedly containing the necessary bacteria from growth of a previous crop. Even after you were through with the laborious task, you weren't absolutely sure you had any bacteria at all, let alone an efficient strain. Moreover, you ran the risk of bringing along any bacterial or fungus diseases that might have been present in the first field.

Must Test Strains

But manufacturers of prepared inoculating cultures found themselves with a much more complicated task. Not only must they test each strain before putting it on the market, lest it suddenly become ineffective, but they must maintain a ceaseless search for new strains with which to replace those that suddenly, without visible explanation, lost their effectiveness.

The same discoveries gave rise simultaneously to the most modern controversy, of an immediately practical nature, concerning legume inoculation. Since the bacteria strains seemed to display such erratic habits, would it not be wise to inoculate such annuals as soybeans each time they were sown in order to insure an effective strain of bacteria in the nodules?

Many conflicting results and opinions have been advanced from experiments and observations on this subject. At Indiana, for example, an experiment reported in 1936 indicated no advantage to inoculation once the bacteria were established in the soil. It was not stated in this report as to what was the length of time betwen seedings on any one plot.

Wisconsin Disagrees

Circular 252 of the University of Wisconsin Extension Service sounds a different note, however: "If the soil already has plenty of effective nodule-forming and nitrogen-fixing bacteria, there will be no point in adding more. However, there is no way of finding this out before the crop has grown. The bacteria that were present in the previous years may have been killed during the winter, or the organisms may be too few to produce a maximum yield. In addition many Wisconsin fields contain poor or non-effective nodule bacteria which even though they form nodules fix no nitrogen. Inoculation of the seed with good strains of the proper organisms is decidedly beneficial under these conditions and in general is insurance against crop failure due to lack in numbers or effectiveness of the soil bacteria."

This picture from the inoculator division of The Albert Dickinson Company shows the results of inoculation. The plants were taken from the same soil area, those in the man's right hand having been inoculated, those in the left sown without inoculation.

At Illinois, too, agronomists seem to favor yearly inoculation. Says Dr. O. H. Sears, professor of soil biology: "In some soybean growing sections of Illinois, the soils are so well infected with soybean nodule bacteria that further inoculation results in small, if any, increases in yield. However, we are of the opinion that most farmers will find soybean inoculation a good insurance and a practice that should be followed yearly."

Results Don't Show

Dr. A. G. Norman, professor of soils at the Iowa Agricultural Experiment Station, expresses a similar view: "We have rather taken the attitude that inoculation is proved to be desirable, since the soybean organism is not the most vigorous or long lived of the rhizobia. Substantial benefits in yield on most of the prairie soils are not easy to obtain because the growth period of the soybean plant corresponds to the period of maximum biological activity of the soil organisms, and the most rapid release of available soil nitrogen."

In other words, where plenty of nitrogen is available without the soybean plant fixing its own, inoculation becomes a matter of conserving soil nitrogen

*Acknowledgement is hereby made to the following men for their cooperation in supplying material and suggestions for this article: George M. Briggs, extension agronomist, and Perry W. Wilson, associate professor of agricultural bacteriology, University of Wisconsin; A. G. Norman, professor of soils, and A. L. Bakke, professor of botany and plant pathology, Iowa State College; O. H. Sears, professor of soil biology, University of Illinois; K. E. Beeson, extension agronomist, Purdue University; Lewis W. Erdman, director of research and production, The Nitragin Company, Inc.; and L. T. Parr, inoculator division, The Albert Dickinson Company.

rather than increasing yield.

A specific example of benefits from inoculation each year is offered as the indirect results of Dr. A. L. Bakke, research professor in the botany and plant pathology section of the Iowa Agricultural Experiment Station, in experiments on control of Creeping Jennie or European bindweed by means of soybeans.

In 1939 two acres of bindweed infested ground which had been in soybeans in 1938 were divided into half-acre plots and seeded to soybeans again, at the rate of 2½ bushels per acre. One plot was used as a control, and the seed sown on it was not inoculated. Seed for the other three plots was inoculated with three commercial cultures, and the amount of dry hay harvested was as follows:

Control ..... 2,385 pounds
Culture No. 1 ..... 2,745 pounds
Culture No. 2 ..... 2,690 pounds
Culture No. 3 ..... 2,850 pounds

The difference between the three cultures is not significant, but the difference between the cultures and uninoculated control merits considerable weight.

Until means are available then, of detecting before the seed is sown the presence and effectiveness of bacteria left from a previous crop, it sounds like good insurance to inoculate soybean seed each year, especially since the cost of inoculating with a good, pre-tested commercial inoculator runs as low as 10 cents per bushel. It seems reasonable that even if such means were available (and there is no indication that such means may become available soon), it would still be cheaper to inoculate than make such tests, since they would necessarily have to be made from several sections of the field to be sure the field was uniform.

A further advantage of inoculating the seed when sown is that an early formation of nodules and fixation of nitrogen is assured, since the bacteria are in contact with the germinating seed.

It would be interesting before closing to see what new light may be expected soon on the complex mechanism and relationships of legumes and their nitrogen-fixing bacteria. This article has already assumed, however, that the reader was fully aware of the benefits of inoculation through increased yield, higher protein content of the crop and maintenance of soil fertility. If it has made clear the point that inoculation is by no means a closed subject, not the perfected technique so many laymen seem to consider it, it will have served its purpose.

New Varieties Released at Three Stations

THREE new soybean varieties recently have been developed at the Tennessee Agricultural Experiment Station. They have been named the Ogden, Volstate and Tennessee Non-pop.

All three were developed by hybridization and selection which continued over a period of several years, reports C. A. Mooers, director of the Tennessee Station.

The Volstate and Tennessee Non-pop are late maturing varieties having about the same length of season as the Tokio, he says. Both are yellow seeded, produce high yields of both seed and hay and retain the seed well enough to be called "non-pop" varieties.

The Ogden is perhaps 2 weeks earlier than the others, produces light-green colored seed and is also a non-pop variety. It yields well in both hay and seed and promises to be a popular variety, especially in the shorter-season parts of the state, Mooers believes.

In the development of these varieties, Tokio was used as one of the parents and also is a standard of comparison as to yields of hay and seed. Tokio has long been recommended by the Tennessee Station for general use in the State, but the new varieties appear to be appreciably superior, Mooers states.

Cornell Names New Variety Ontario

Ontario, a new soybean only recently named, has been released by the Cornell University Agricultural Experiment Station, Ithaca, N. Y. It is extremely early in maturity, rather short in stature, determinate in habit of growth, uniformly yellow in color, has a dark hilum, is nearly round and is medium in size, as described by R. G. Wiggans of the department of plant breeding.

Although not outstanding in yield, the Ontario always matures under New York conditions, which is true with very few varieties, Wiggans says. The average analysis for three years has shown 20.03 percent oil and 40.62 percent protein. A limited supply of seed is available this year.

Its only advantage over Cayuga is in color and oil content, and it has the disadvantage of being even shorter than Cayuga. It is a selection out of U. S. 65344 and probably is not very different from it. The strain is kept pure with difficulty when grown in close proximity with other varieties because of high percentage of natural crosses under the northeastern environment, Wiggans reports.

Illinois Releases Chief, A New Hybrid

A new variety released at Illinois is the Chief (formerly Type 119), a selection from a hybrid between Illini and a strain of Manchu. It is described as follows by C. M. Woodworth, professor of plant genetics at Illinois Agricultural Experiment Station, Urbana:

"The Chief has yellow seed with imperfect black hilum, gray pubescence and purple flowers. Seed size is about the same as Illini, there being approximately 3,600 seeds to the pound. The plants are, on the average, about 6 inches taller than Illini plants, and mature approximately 5 days later under conditions at Urbana, Ill. It ranks along with Illini in resistance to shattering and lodging. It also possesses the desired character that Illini has of responding to high fertility levels. In general, its adaptation range includes the central south central portions of Illinois."

—sbd—

Racketeers Invade Soybean Seed Field

A variety of soybeans known as McClave (from Ohio) or New London (from Indiana) is being promoted in Ohio, Indiana and Illinois by means of leaflets, with the seed price tagged at $25 per bushel.

All characteristics indicate it is the old Midwest or a close relative, obtained as a mixture from a field of soys, and multiplied, says Prof. K. E. Beeson, extension agronomist at Purdue University. If so, industry does not like its low oil yield, and the plant itself is far more impressive than its yielding ability, although in seasons favorable to late varieties, it will do well — provided the seed is not lost by shattering, says Professor Beeson.

In 1939, however, the Midwest was the lowest yielding of standard yellow varieties on test at five Ohio experiment fields. The Midwest has practically disappeared in Indiana because of late maturity, pronounced shattering and lower yielding ability than standard varieties like the Manchu and Dunfield.

—sbd—

Joins Miner Labs

Dr. Archie Cramer, formerly a member of the faculty of the Carnegie Institute of Technology at Pittsburgh as research associate, has joined the staff of the Miner Laboratories in Chicago to pursue research on soybean products.

—sbd—

Ordered Off Sale

A "new synthetic root-hormone product for corn and other cereals" has been ordered taken off sale by the Indiana state chemist, until such time as it is eligible for registration. It will not be eligible for registration until its manufacturers have given substantial proof of its worth, according to Indiana law.

Packaged in a powder form for dusting on the seed before planting, its manufacturers, a horticultural chemical company, state they "have reason to believe" that its use will show "satisfactory results" when used on beans.

—sbd—

Lard and grease production is expected to be substantially smaller in 1941 than in 1940, because of reductions in the hog crop.

THE Soybean Digest

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GEO. M. STRAYER, Editor — J. W. TOWNSEND, Managing Editor

VOL. I · NO. 5

THAT most of the members of our state legislature are not fully aware of the significance of the soybean crop to American agriculture has become apparent during recent weeks. Bills designed to curb or prohibit the use of soybean oil food products have been offered in the legislatures in many states. Several are receiving serious consideration.

Lawmakers of the nation, traditionally lawyers or city men, do not realize that in margarine or shortenings our soybean oil finds its markets. Your job, and mine. is to acquaint them with that fact. Too, we must in some way make people realize that today's major soybean oil markets are in the edible field, and that the meal must be sold as livestock feed. Publicity has greatly over-emphasized industrial uses. They have great potential capacity — but do not use the 1940 crop of beans.

If soybeans are to find their rightful place in our American agriculture they must not be hampered by unfavorable legislation. As growers, handlers, and processors of beans we must use our influence to see that our interests are protected. Make your will known to your legislature. We must get away from building trade barriers and restrictive trade walls around our states. Soybean interests can logically lead in the prohibition of further barriers, as well as assisting in removal of those short-sighted ones already erected.

IN choosing seed of new varieties of soybeans we suggest that you use care and discretion. Word reaches us from Ohio and Indiana that a bit of racketeering has crept into the seed end of the industry. Be sure of your varieties before purchasing at fantastic prices. One variety being promoted in those states has not shown itself to be all that is claimed for it. It, allegedly, is merely an old variety renamed.

Which leads us to comment that in the work now being done in varietal development by the Regional Soybean Industrial Products Laboratory and the cooperating state agricultural colleges lie some tremendous possibilities. Our present varieties are introductions from the Orient. Production of new varieties by hybridization is proving to have tremendous possibilities. The breeding programs merit your interest — your support. Don't overlook the work which is being done by these men without benefit of ballyhoo. We predict that in a few years you will be growing their new and improved varieties of soybeans.

ADVANCE word reaches us that the March 22 issue of *The Ohio Farmer* is to be a special soybean issue, devoted to a series of articles covering the important phases of the soybean industry. To Walter Lloyd, editor, we award the orchid of the month for recognizing America's fastest growing agricultural industry and devoting his editorial pages to it. His soybean articles are not limited to this one issue, however. They have been run as the news has been available during past years. Now the Ohio master work is to appear. Good work, Walter! We doff our hats!

A NOTE of appreciation is due from the soybean industry to the agricultural development department of the Baltimore and Ohio railroad for its excellent work in promoting interest in the soybean by means of the six-car Soybean Special now in the second month of its tour through Ohio, Indiana and Illinois. In the same breath, the work of agronomists and extension service men from the state universities in these three states deserve a word of thanks for the time and work they are giving in cooperation with the project.

The extent of their work is more fully appreciated when one sees for himself the size of the audiences attracted. When our managing editor visited the train at Bowling Green, Ohio, he found the men's lecture car packed (and all cars are full-sized railroad coaches, too) with some even standing in the rear of the coach. But that was only half the story. In the women's lecture car on the other side of the exhibit car, was another capacity crowd of homemakers, learning how soybeans could assume a tasty and healthful part in the human diet, while their husbands learned of varieties and cultural practices.

Geo. M. Strayer

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Early Chinese Disagreed on Planting Time

Modern Problem Troubled Early Experts Too, Reviews of Ancient Chinese Agricultural Literature Reveal

By W. J. MORSE
Bureau of Plant Industry
U. S. Department of Agriculture

ALTHOUGH the soybean was first grown in the United States in 1804 and has been under test extensively during the past two decades, the best time for planting as a seed crop in different regions is an ever-recurring question. Similar to many other agricultural problems, it is one to which an exact answer cannot always be given. In reviewing some translations of ancient Chinese literature*, the best time of planting soybeans obviously was more or less of a problem with the Chinese farmer centuries ago.

In the earliest written records, writers on various agricultural problems gave plenty of advice as to the proper time to plant "Ta tou" or "Shu" (soybeans). The best time of planting given by these ancient agricultural writers was usually based on the position of some of the heavenly bodies or nature's signs of spring similar to those used by the American Indian in planting corn or beans. Many growers and agronomists in the United States have different views as to the proper time of planting for the best results. In view of this, it was thought that a few of the choice extracts from some of these old Chinese books might be of interest to our American soybean growers.

In one of the oldest writings, Calendar of the Hsia dynasty, we find: "In the fifth month when we first see the planet Mars in its zenith in the Heart constellation, then it is time to plant the Shu, or bean."

The Hsiao Ching (Book of Filial Piety) says: "Red soil is suitable for the Shu. This bean is a staple crop, which may be stored and kept to provide against famine and is easily made suitable for food. In ancient times it was used as a food in times of scarcity. Count the number of persons in the family and plant five acres for each person. This is a fundamental rule in farming. In the third month about the time when the seed pods appear on the elm trees, and after a rain has fallen, the uplands may be planted with Ta tou seed. The soil should be fine and free from lumps of earth. Seed of the Ta tou may be planted within twenty days of the summer solstice (June 21) with assurance that it will bud and grow. The best results are obtained when the earth has not been plowed too deeply. The Ta tou thrives best when planted evenly and not too closely."

The Shuo Yuan (Anecdotes from Ancient Chinese History) has the following: "In the summer season when the planet Mars is in its zenith, we may plant the Shu, or bean. These writers all say that the Shu, or bean, should be planted in the fifth month, while the Nung Sang Chi Yao quotes the Chi Min Yao Shu and says that the Ta tou should be planted in the spring following the planting of the grain. That which is to be harvested late in the season can be planted in the fifth or sixth month. When planted in the fifth or sixth month, additional seed should be sown."

Li Shih-chen writes: "The Ta tou bean may be planted before and after the summer solstice (June 21)."

The Ts'u Shih says: "The Ta tou may be planted in the second month during the period when the constellation, Orion, is in the heavens. At this time when the apricot blossoms are abundant and the fruit of the soft mulberry is red, the Ta tou may be planted, this being the best season for planting. In the southern part of China, the Ta tou is planted before and after the Spring Grain Festival and in the time of the summer solstice (June 21) the plants are covered with clusters of pods."

From the Chi Min Yao Shu (Important Rules for the People to Gain Their Living in Peace) we learn: "In the spring season the Ta tou is planted after the grains. Between the tenth and twentieth days of the second month is the proper time for the first crop. Use eight pints of seed. Between the first and tenth days of the fourth month is the proper time to plant the third crop. Use one peck and two pints of seed. A late crop may be obtained by planting in the fifth or sixth month. Naturally the harvest will be late according as the seed is sown late. The beans which have ripened of the crop planted in the autumn may be harvested, but these are few as the stems grow densely and yield but few beans. The seeds should be planted deeply because the nature of the bean is strong and the stems

(*Continued on page 11*)

Planting soybeans on ridges in Manchuria.

*Translations of extracts concerning the Ta tou, or soybean, from the Chih Wu Ming Shih T'u Kao by M. J. Hagerty, Chinese Translator, U. S. Department of Agriculture, May, 1917.

The Chinese farmer plants beans by hand as his ancestors have for many centuries.

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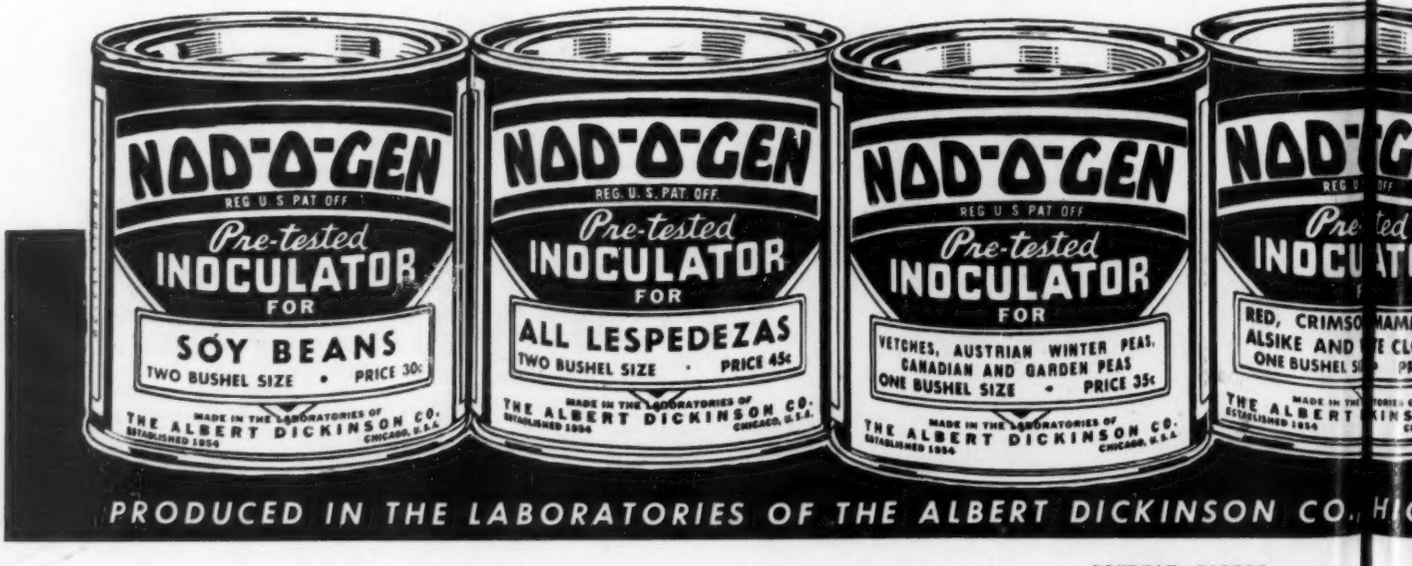

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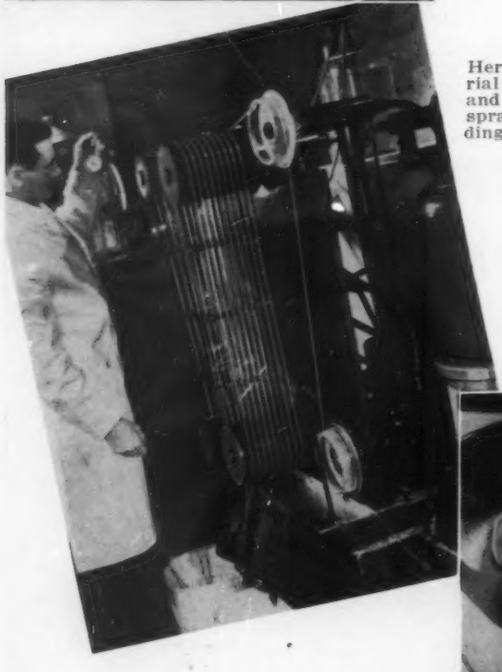
Shown here is the viscous soybean protein solution from which comes synthetic fibre, one of Boyer's discoveries.

Robert Boyer, left, is shown here discussing with Henry Ford some of the materials that are being used in making plastic body parts. Boyer is in charge of the chemical laboratory where this experimental work is carried on by young men whose ages average only 24.

These scenes are from the laboratory where Robert Boyer and his 25 assistants are making soybean history. The cuts are by courtesy of *Future*, published by the United States Junior Chamber of Commerce.

Synthetic fibre is run through the carding mill by one of the youthful staff. A plant is being built to make it. It is used in a mixture with sheep's wool. Ford treasures a suit made of 25 percent "soybean" wool, 75 percent sheep's wool.

The resin and the fibres are being mixed in this scene. The mixture is used to make other parts for cars as well. The plastic as it will be used in the car bodies is inferior to steel in tensile strength, but has 10 times the impact strength. A blow from an axe which pierces a sheet of steel leaves a plastic panel unmarred.



Here the fibre is being spun. This material will be used to make both upholstery and seat cushion padding. The fibre is sprayed with rubber when used as padding.

This scene shows a batch of the synthetic resin that is mixed with fibres in the manufacture of plastic bodies. Definite plans for a plastic car were launched in 1938, although it was in 1934 that Ford remarked "some day we'll grow a car."

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Boyer Gets JCC Service Award for '40

One of the highly publicized dreams for soybean plastics appears to be coming true, with the announcement of the Ford Motor Company that the first test model of a motor car with a plastic body is on its way. Dies are now under construction at the Rouge plant.

To Robert Allan Boyer, 31-year-old chemist who conducted the 10-year research program which is to culminate in the plastic car, went the United States Junior Chamber of Commerce Distinguished Service award for 1940. Boyer was presented with a diamond key Jan. 22 in Detroit for his work in designing the car.

It was in December, 1931, that Henry Ford and Boyer decided to concentrate on the soybean as the farm crop that industry could best mould to its purposes. This was after a year's intensive research on the possibilities of nearly every farm crop known.

The first obstacle was to design a solvent-process plant, then practically unknown commercially in the United States. Then, a piece at a time, Ford began using soybeans in his cars. Plastics were used in horn buttons, electrical systems, instrument panels, body paint. The entire superstructure of the new car is to be a soybean plastic, and a mill is under construction to produce a synthetic soybean wool, developed in 1936, for use in upholstery.

Boyer believes the plastic car can compete with steel even on an economic basis. Although raw material cost is higher, the plastic requires a lesser number of fabricating and finishing operations. For example, the relatively simple rear door when made of steel requires no less than seven stamping operations, while not more than two are required for the same panel made of plastic.

Wanted . . MILLIONS OF POUNDS OF SOYBEAN OIL

● **In the light of expanding Soybean production and curtailed foreign markets, sales of Soybean Oil to Margarine manufacturers must be substantially increased. Today manufacturers of Margarine should be using many millions of pounds of Soybean Oil per year in addition to the 82,333,941 pounds used during the Federal Fiscal year ending June 30th, 1940.**

Consumers all over America want to buy Margarine made from Soybean Oil, but in many States they seldom get the chance. Discriminatory State and Federal Taxes hinder the sale of this Soybean Oil product. They deny American farm producers a legitimate market for their oils and fats and milk. These taxes are unfair to the growers of Soybean, corn and peanut oils and animal fats. They should be repealed. For years the Institute of Margarine Manufacturers fought to have them repealed. Now — with your help — the fight can be won.

Get in touch with your State — your Federal Legislators. Write to them. Urge them to get behind this campaign for repeal of these unfair, un-American Tax Laws.

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Lab Consolidation Rumors Denied by USDA

MAINTENANCE of the United States Regional Soybean Industrial Products Laboratory at Urbana, Ill., will be continued, despite recent rumors that it was to be consolidated with the United States Regional Agricultural By-Products Laboratories, according to a letter received by J. D. Craig of Spencer Kellogg and Sons, Inc., and chairman of the special Soybean Laboratory Committee of the National Soybean Processors Association. The letter, dated Feb. 13, was signed by Grover B. Hill, acting secretary of the United States Department of Agriculture.

The letter was written in answer to objections to such a consolidation filed with Dr. Henry G. Knight, chief of the bureau of agricultural chemistry and engineering, by the Special Soybean Committee. Acting Secretary Hill's letter is quoted in part:

"I am personally aware of the tremendous interest in this laboratory and the well-merited support which the work is receiving from your committee and others interested in the development of uses for the soybean and soybean products. The Soybean Laboratory, as you know, was established and is supported under an allotment of funds authorized under an Act 'to provide for research into basic laws and principles relating to agriculture . . ., known as the Bankhead-Jones Act. It is the intention of the Department to continue support of this laboratory at Urbana as long as the funds available for research work provided in this Act are continued in such a way as to permit continuation of the work under the Bankhead-Jones Act at its present scope and so long as the soybean research program developed seems to justify such an allotment of funds. The Budget for the fiscal year 1942 as submitted to Congress is presented on this basis.

"With respect to the rumors mentioned in your letter, it is correct that from time to time in connection with the discussion of the annual budget the question has been raised as to the consolidation of the work of some of our sectional laboratories, including the Soybean Laboratory, with work authorized by the Act supporting the Regional Laboratories for Industrial Research in the utilization of farm products. In regard to the consolidation of the Soybean Laboratory, the Department has not felt that this would be advisable and we hope we will be able to maintain the work as at present organized."

—sbd—

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Minnesota Growers Consider Crushers' Needs

Soybean growers in southern Minnesota are becoming increasingly aware of the needs of crushing plants in selecting their varieties. Seed inquiries reveal a renewed interest in the Manchu variety. This follows publication of the fact that this variety is wanted by crushing plants because it averages nearly 2 percent higher in oil content than Habaro, another common variety.

Until last year, Habaro soybeans had been increasing in popularity because they are a few days earlier in maturity and showed more resistance to lodging. However, with the erection of a soybean processing plant at Mankato, farmers became conscious of soybeans as a cash crop. Consequently high oil varieties are in greater demand.

Personally, I would use the Habaro variety for hay and silage, primarily because it stands up better. However, the Manchu variety would be my choice if I were growing beans for crushing purposes. Many years of trial indicate that the two varieties are about equal in seed and hay yields. Therefore, the final choice of a variety depends upon the purpose for which it will be used.

Minnesota farmers interested in growing soybeans should secure Extension Bulletin 134, "Soybeans for Minnesota," by A. C. Arny, division of agronomy and plant genetics, W. W. Brookins, agricultural extension division, University Farm, and R. E. Hodgson, Southeast Experimental Station, Waseca. It deals with such topics as choice of varieties, planting rates, methods of planting and harvesting, and uses of the crop. — Winfield Forsberg, Winthrop, Minn., correspondent.

—sbd—

Processors and agronomists in Ohio met March 12 for their second annual conference on soybean production and utilization. The sessions were held in Main Building at the Ohio Agricultural Experiment Station at Wooster.

Early Chinese Disagreed On Planting Time

(*Continued from page 5*)

of the roots will in this way get plenty of moisture. Ta tou thrives best when the climate is warm. If the land is not plowed in the fall then the soil will not be moist."

Fan Shen-chih's Chih Shu states under the heading of "Method of cultivating the Ta tou": "Dig holes for seeds about six inches deep and about two feet apart. In one acre, sixteen hundred and eighty holes should be made for planting seed. When these holes are all made each should receive a pint of good manure mixed with earth, and filled. When about to plant the seed, irrigate each hole with three pints of water. Sow three seeds to each hole and spread the earth over the hole, but not very thick, using the hand to pat it down, bringing the seeds and earth in mutual contact. When the seed has germinated and grown five or six leaflets, the plants should be cultivated with a hoe. When the soil becomes dry, irrigate, using three pints of water to each hill of beans. One man can take care of five acres up to the time of fall harvest. Each acre planted with seed will yield 35½ bushels of seed." As to time of planting, this same writer advises: "In the third month when the elm tree is bearing its seed pods and after a rain, the Ta tou may be planted on the elevated fields. Within twenty days after the summer solstice (June 21) the seed also may be planted. There is an early and a late variety. The late variety is planted in the fifth month at the latest."

—abd—

Many Soybeans Still In Wisconsin Fields

Bean prices could be better but I wish I had my crop harvested. One grower near Janesville, Rock County, Wisconsin, had 60 acres in the field the last days of February, 1941. The unreasonable winter weather of early November, 1940, caught many soybean growers in Wisconsin with their crops in the same condition as the man near Janesville.

According to Phillip Eastman, superintendent of the oil mill at Milwaukee, the late harvested beans have been delivered with anywhere from 25 percent to 40 percent moisture content. A heavy penalty to the grower because of high moisture beans was given, but it became a problem for the mill to handle such beans.

After checking the receipts of Wisconsin grown beans delivered to Milwaukee, Eastman estimated about 50,000 bushels were delivered by truck. Thus Wisconsin is just getting started in growing soybeans for oil.

Ozaukee County boasts of having a soybean grower for seed these last 20 years. That is Ed Wegmon of Cedarburg, Wis. It seems that Wegmon and George Briggs, extension agronomist, became acquainted about that time. Wegmon says, "I have a brother down in old 'Indiany' and you know he told me it wouldn't be long and we would read about having more beans than oats in Indiana and now they have it."

We in southeastern Wisconsin will not go into beans quite so strong for a cash crop because we have a great number of canning factories to supply with cash crops. We do feel fortunate in having an oil mill within trucking distance of our farms.

From the general inquiries for seed, the soybean growers will increase again in our community this coming season. Some of the prospects have noted how little la or is involved in handling the crop. The chief variety is the Wisconsin Manchu No. 3. Another variety grown which seems to be a very good bean for our section of the state, is the Mukden.

Ozaukee County growers have set their Manchu seed price at $1.50 per bushel at the farm. Germination of the seed has been well above 90 percent. According to the writer's survey there are about 2,000 bushels of seed stock available for buyers. — John P. Dries, Saukville, Wis., correspondent.

ANOTHER STEP AHEAD

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Legume Bacteria are perishable. They will not survive without adequate moisture. That's why Hermetically-Sealed *PLIOFILM Inner Bags are used. They are considered to be the "last word" in moisture-holding efficiency.

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This new idea in Soybean Inoculant Packaging appeals strongly to progressive Soybean Growers because it saves a lot of time on busy planting days.

No guesswork. No measuring. No time wasted. It's ready to use.

Simply take one of the 5 bushel size inner packages for each 5 bushels of seed you wish to inoculate.

And even with the convenience of the multiple-inner-packages, prices are less than you no doubt have paid for ordinary large bulk packages.

A trial will convince you.

Shows strong difference between uninoculated and inoculated Soybeans. Agri. Lab. Inc. inoculants were used.

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ANOTHER STEP AHEAD

Market Street

We invite the readers of *The Soybean Digest* to use "MARKET STREET" for their classified advertising. If you have processing machinery, laboratory equipment, soybean seed, or other items of interest to the industry, advertise them here.

Rate: 5c per word per issue. Minimum insertion $1.00.

TRY 2-POUND package delicious Soy Bean Flour and vacuum packed Soy Products. Judd's Health Foods, Asheville, N. C.

EDIBLE SOYBEANS — Aoda variety. Purity 99.9 percent, germination 94 percent. Write for price. Frank C. Gees, Lebanon, Ill.

Texas is considering placing a 20 percent tax on paper towels, admittedly as a retaliatory measure against Wisconsin's high margarine tax.

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SOY BEAN

IT HAS been truly said the sacred grain of ancient China is becoming the wonder plant of modern America. The amazing expansion of the Soy Bean Crop in North America presages its destiny to become a source of new wealth. Of benefit to both the farmer and to industry, it is forming a partnership of growing importance.

In the Ford industries, research on the manufacture of various products from the Soy Bean continues apace. Three processing plants are now in operation to recover Soy Bean oil for industry and to prepare Soy Bean oil meal as a protein supplement in feedstuffs. We invite your inquiry on

White or Toasted
SOY BEAN OIL MEAL

Protein . . .	Min. . .	.44%
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Featuring those recipes for which the old South has become famous, the booklet should be a welcome addition to the library of any housewife. There is no charge.

—sbd—

Equipment Firms Merge

Seed Trade Reporting Bureau, Inc., 223 West Jackson Blvd., Chicago, has purchased the business of Harry B. Olson, Grain and Seed Testing Equipment, and the consolidated business will continue to operate under the name Seed Trade Reporting Bureau, Inc., at the same address. C. S. Phillips will continue to act as general manager, assisted by P. W. Burrows.

—sbd—

Dry Weather Blamed For Low '40 Yield

TOTAL 1940 soybean production in the United States was placed at 79,837,000 bushels in January estimates of the Illinois Cooperative Crop Reporting Service at Springfield. This was a reduction of 12.5 percent from 1939's production of 91,272,000 bushels.

For the previous three years, each year's production had been markedly above that of the preceding year. The stage was set for this to recur in 1940 as the acreage grown alone for all purposes reached 10,528,000 acres, the first year the acreage grown alone has gone over the 10 million acre mark.

But the dry, hot weather in July and early August severely curtailed yields in the important soybean states of Illinois, Indiana and Ohio, and in addition the earlier intentions to increase the percentage harvested for beans did not materialize. The final percentage harvested for beans for the three-state area was the same as in each of the two preceding years.

The lower production in 1940 is due entirely to the low yield per acre, which is 16.1 bushels per acre for the United States compared with the 1939 yield of 20.7 bushels. Even after allowing for the curtailment in the percentage harvested for beans compared with earlier intentions, the estimate of absolute acreage harvested for beans is 4,961,000 acres, which is 12.3 percent above the acreage harvested last year, and the largest harvested acreage on record.

For all soybean producing states outside Illinois, Indiana and Ohio, production is over a fourth larger than last year, due to nearly a corresponding increase in acreage harvested, yields being quite uniformly close to last year. Acreage harvested, yield per acre and production in the leading soybean states in 1940 with 1939 comparisons are given in the table below:

State	Acreage Harvested 1939	Acreage Harvested 1940	Yield per Acre 1939	Yield per Acre 1940	Production 1939	Production 1940
	Thousand Acres				Thousand Bushels	
Illinois	1,911	2,008	24.5	17.5	46,820	35,140
Iowa	564	733	20.5	20.5	11,562	15,026
Indiana	740	814	19.5	13.5	14,430	10,989
Ohio	484	560	21.0	15.0	10,164	8,400
N. Carolina	161	169	12.5	13.5	2,012	2,282
Michigan	60	84	16.0	14.0	960	1,176
Missouri	97	112	10.0	10.5	970	1,176
Mississippi	72	85	9.0	10.0	648	850
Wisconsin	20	37	16.0	17.5	320	648
Minnesota	30	40	17.0	16.0	510	640
Ten leading states	4,139	4,642	21.4	16.4	88,396	76,327
All other	278	319	10.3	11.0	2,876	3,510
United States total	4,417	4,961	20.7	16.1	91,272	79,837

SEED DIRECTORY

Members of the American Soybean Association may list varieties of which they have seed for sale in the Seed Directory of The Soybean Digest. Up to three varieties may be listed throughout the seed trade season, January, February, March and April issues, for a charge of $1 to Association members. Additional varieties may be listed at the same rate, three for $1.

FIELD VARIETIES

Mukden

Tracy and Son Farms, Janesville, Wis.
Strayer Seed Farms, Hudson, Iowa.
Hilmer B. Schauer, R. 3, Hartford, Wis.
S. B. Simons and Sons, R. 1, Elkhorn, Wis.

Wisconsin Manchu No. 3

Tracy and Son Farms, Janesville, Wis.
Henry Petesch, R. 1, Belgium, Wis.
Hilmer B. Schauer, R. 3, Hartford, Wis.
Leo Kultgen, R. 1, Box 207, Belgium, Wis.
Fred Scherwitz and Son, R. 3, Fort Atkinson, Wis.
S. B. Simons and Sons, R. 1, Elkhorn, Wis.

Richland

Strayer Seed Farms, Hudson, Iowa.
W. N. Woods and Son, R. 1, Maumee, Ohio (registered).
Frank J. Anderson, R. 5, Frankfort, Ind. (certified).

Habaro

Hilmer B. Schauer, R. 3, Hartford, Wis.

EDIBLE VARIETIES

Banzei

W. N. Woods and Son, R. 1, Maumee, O.
Farm-Management, Inc., Irwin, Ohio.
Strayer Seed Farms, Hudson, Iowa.
"Soybean" Johnson, 1151 Claytonia Terrace, Richmond Heights, Mo.

Bokusun Lima Size

Tastee Soy Foods, 254 East Girard Ave., Philadelphia, Pa.

Green Giant

Tastee Soy Foods, 254 East Girard Ave., Philadelphia, Pa.

Kwikook Yellows

Tastee Soy Foods, 254 East Girard Ave., Philadelphia, Pa.

Jogun

Strayer Seed Farms, Hudson, Iowa.

Aoda

"SoyLean" Johnson, 1151 Claytonia Terrace, Richmond Heights, Mo.

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Feeds	**Canned Foods**	**Adhesives**
Fertilizer	**Margarine**	**Core Oil**
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Paints	**Sausage**	**Paper Manufacturing**
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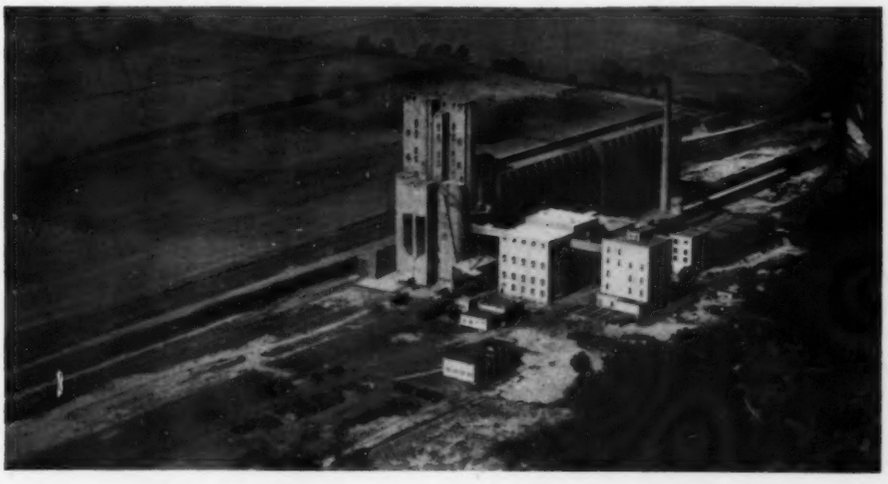

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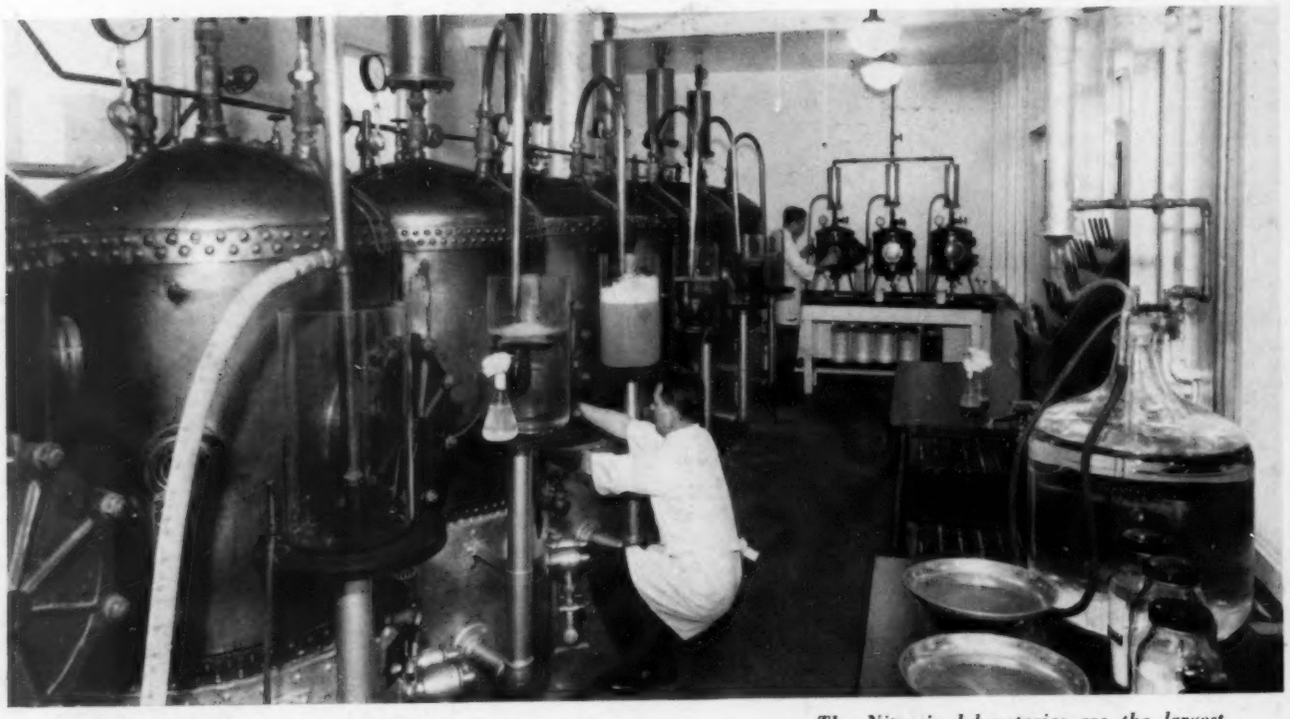

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